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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,959	07/22/2005	Thomas Juestel	PHDE020192US	3623

38107 7590 03/08/2007
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
595 MINER ROAD
CLEVELAND, OH 44143

EXAMINER

ROSENBERGER, FREDERICK F

ART UNIT	PAPER NUMBER
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2884

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/524,959	Applicant(s) JUESTEL ET AL.	
	Examiner Frederick F. Rosenberger	Art Unit 2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 February 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>2/18/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d) from the International Bureau for PCT/IB03/03614, which papers have been placed of record in the file. The International Search Report, dated 20 November 2003, for said application has also been communicated and considered.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the color converter and light guide arranged between the sensor and the photodiode per the limitations of claims 6-8 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering

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of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The use of the trademark Lumogen has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claim Objections

4. Claim 2 is objected to because of the following informalities: In claim 2, applicant recites the formula of $(\text{Lu}_{1-x}\text{Y}_x)\text{SiO}_5:\text{Pr}$. It is submitted that this formula is chemically incorrect. For example, for the case of $x=1$, the resulting scintillator should be $\text{Y}_2\text{SiO}_5:\text{Pr}$ instead of $\text{YSiO}_5:\text{Pr}$. Similarly, for $x=0$, the resulting scintillator should be $\text{Lu}_2\text{SiO}_5:\text{Pr}$. See table 1 of the present disclosure for examples. Appropriate correction is required.

Claim Rejections - 35 USC § 102

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5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 2, 3, 4, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by van Eijk et al. (Journal paper entitled " Nd^{3+} and Pr^{3+} Doped Inorganic Scintillators").

With regards to claims 1, 3, 4, and 9, van Eijk et al. disclose a device for the detection of input radiation comprising a Pr^{3+} -activated scintillator (Table 2, page 666), converting input radiation into UV radiation (Table 2 and Figure 3) and a photodiode to convert the optical signal from the scintillator into an electrical signal (top of first column of page 665), wherein the scintillator is used in a PET or gamma camera (i.e. SPECT) imaging system (Table 1 and first column of page 664).

With regards to claim 2, Eijk et al. further teach the scintillator compounds of $\text{YPO}_4:\text{Pr}$ and $\text{Y}_2\text{SiO}_5:\text{Pr}$ (Table 2), which are members of the claimed group with $x=1$.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over van Eijk et al., as applied to claim 1 above, and further in view of Srivastava (US Patent # 5,273,681).

The disclosure of van Eijk et al. addresses all the limitations of parent claim 1, as discussed above. Further, the disclosure discusses use of the scintillators for X-ray applications (i.e. high energy physics and airport security) (column 1 on page 664) as well as the response of the scintillators to X-ray radiation (Figure 3). However, van Eijk et al. do not specifically recite that the scintillator is employed in an X-ray imaging method.

Srivastava teaches that Pr-doped scintillators, also referred to as phosphors or luminescent compositions, are employed in X-ray imaging devices, such as CT scanners, as well as the nuclear imaging field, such as PET (column 1, lines 7-14).

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to employ the X-ray responsive scintillator of van Eijk

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et al. in an X-ray imaging system, since Srivastava teaches that Pr-doped scintillators may be used in either nuclear imaging or X-ray imaging applications.

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over van Eijk et al., as applied to claim 1 above and further in view of Boerner et al. (US Patent Application Publication # 2001/0006214).

With regards to claim 6, the disclosure of van Eijk et al. addresses all the limitations of parent claim 1, as discussed above. Further, the article recognizes the advantage of longer emission wavelengths for matching with the sensitivity curves of silicon photodiodes. However, van Eijk et al. primarily discuss coupling the scintillator with the photodiode without color converter.

Boerner et al. teach a scintillator layer that emits radiation in a short wavelength (i.e. bordering the UV region around 400nm) and using a color-transforming layer to convert the emitted radiation to a wavelength more suited to the spectral sensitivity of the detector (abstract, paragraphs 8, 16, 17). Boerner et al. teach that such a technique enables a larger part of the X-ray radiation to be used for image analysis (abstract).

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to provide a color-converting layer between the scintillator and the photodiode so as to convert the emitted radiation to a wavelength more suitable for the spectral sensitivity of the detector, thereby allowing a larger part of the X-ray radiation to be used for image analysis, as taught by Boerner et al.

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11. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over van Eijk et al. and Boerner et al., as applied to claim 6 above, and further in view of Tonami et al. (US Patent # 5,909,029).

With regards to claims 7 and 8, the combination of van Eijk et al. and Boerner et al. disclose all the limitations of parent claim 6, as discussed above. Further Boerner et al. allow for the color transforming luminous substance (paragraphs 12-13) to be incorporated in a polymeric layer between the scintillator and photodiode or in a separate layer between the scintillator and photodiode (paragraph 28). However, the combination is silent with regards to a light guide being provided between the scintillator and photodiode.

However, such combinations are known in the art. For example, Tonami et al. teach a detector for X-ray imaging using a scintillator 1 and a photodiode 2 (Figure 3). Tonami et al. further provide a light guide, in the form of an array of optical fibers 4, between the scintillator 1 and the photodiode 2. Tonami et al. teach that such a configuration prevents the dispersion of light in the lateral direction of the photodiode surface as well as serving to protect the photodiode elements during handling (column 3, lines 25-41).

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to provide a light guide between the scintillator and the photodiode so as to prevent the lateral dispersion of light while protecting the photodiode elements during handling, as taught by Tonami et al. The incorporation of the color-transforming component suggested by Boerner et al. either as a dopant in the

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optical fiber plate or as a separate layer thereon would have been further obvious to one of ordinary skill in the art since polymer fiber optics are known in the art as are wavelength shifting dopants added thereto (see, for example, Anderson et al.).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Anderson et al. (US Patent # 5,334,839) teach doping the cladding of optical fibers to enable scintillated UV light to be converted to visible light for ease of detection (column 7, lines 25-36).

McClellan et al. (US Patent # 6,689,293) teach a Pr-doped oxyorthosilicate phosphor.

Juestel et al. (US Patent # 6,734,631) teach a fluorescent lamp employing a Pr-doped UV-emitting phosphor.

Srivastava et al. (US Patent Application Publication # 2006/0027742) teaches a Pr³⁺ doped scintillator with a photodiode capable of responding to X-ray or gamma ray events. It is noted that this reference would be overcome by applicant's foreign priority.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frederick F. Rosenberger whose telephone number is 571-272-6107. The examiner can normally be reached on Monday - Friday with flexible hours.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Frederick F. Rosenberger
Patent Examiner
GAU 2884


